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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/262,657	03/04/1999	SHUNPEI YAMAZAKI	SEL-126	9735

7590 07/18/2003

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EXAMINER
PRENTY, MARK V

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 07/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/262,657	YAMAZAKI ET AL.	
	Examiner	Art Unit	
	MARK V PRENTY	2822	

-- The MAILING DATE of this communication appears on the cover sheet with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 May 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,5,7,8,10,11,13,14,30-42,44-47 and 49-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,5,7,8,10,11,13,14,30-42,44-47 and 49-56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

This Office Action is in response to the amendment filed May 13, 2003.

The applicant has apparently changed claim 1's "added" back to "doped" without indicating such in the marked-up copy of claim 1 (the applicant changed claim 1's "doped" to "added" in the amendment filed October 9, 2001). "Added" is more correct.

The examiner again notes the specification at page 6, lines 26-29: "At this time, although the adding conditions may be appropriately determined by the practitioner, there is a necessity of adding germanium to fulfill a composition of $Si_{1-x}Ge_x$ ($0 < x < 1$)," (emphasis added).

Claims 52, 54 and 56 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Independent claim 52's "said $Si_{1-x}Ge_x$" lacks antecedent basis (in this regard, note that claim 52's subsequent "wherein said first semiconductor film contains germanium at a higher concentration than said second semiconductor film and the second semiconductor film is not intentionally added with germanium," clause will be redundant if proper antecedent basis for "said $Si_{1-x}Ge_x$" is provided, as per the specification at page 6, lines 26-29).

Claims 54 and 56 depend on independent claim 52 and are thus similarly rejected.

Claims 1, 2, 4, 5, 10, 11, 30, 31, 33, 34, 39-42, 44-47, 49-52, 55 and 56 are rejected under 35 USC 103(a) as being unpatentable over Zhang et al. (United States Patent 5,614,733 – hereafter Zhang '733 – cited in the Information Disclosure

Statement filed April 23, 2001) together with Saraswat et al. (United States Patent 5,250,518 – hereafter Saraswat – already of record).

With respect to independent claim 1, Zhang '733 discloses a semiconductor device (see the entire patent, including the Fig. 5 embodiment, for example) comprising: a substrate 21; a first thin film transistor having a first active layer 26a comprising silicon (Si) formed over said substrate; and a second thin film transistor having a second active layer 26b comprising silicon formed over said substrate wherein said second active layer is not intentionally doped with germanium, wherein the first active layer 26a and the second active layer 26b are formed on a same insulating surface over the substrate.

Zhang '733's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 26a is part of a peripheral driver circuit and the second thin film transistor having a second active layer 26b is part of the matrix region.

The difference between Zhang '733's semiconductor device and claim 1's semiconductor device is Zhang '733's first thin film transistor's active layer comprises silicon while claim 1's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$.

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '733's first thin film transistor's active layer 26a of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 1 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to independent claim 2, Zhang '733 discloses a semiconductor device (see the entire patent, including the Fig. 5 embodiment, for example) comprising: a substrate 21; a first thin film transistor having a first active layer 26a comprising silicon (Si) formed over said substrate; and a second thin film transistor having a second active layer 26b comprising silicon formed over said substrate, wherein said second active layer contains no germanium, wherein the first active layer 26a and the second active layer 26b are formed on a same insulating surface over the substrate, and wherein said first thin film transistor constitutes a CMOS circuit.

Zhang '733's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 26a is part of a peripheral driver circuit and the second thin film transistor having a second active layer 26b is part of the matrix region.

The difference between Zhang '733's semiconductor device and claim 2's semiconductor device is Zhang '733's first thin film transistor's active layer comprises silicon while claim 2's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$.

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have

significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '733's first thin film transistor's active layer 26a of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 2 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to dependent claims 4 and 5, Saraswat's $Si_{1-x}Ge_x$ is polycrystalline silicon germanium (see Saraswat's Abstract, for example) and Zhang's '733's silicon 26b is polysilicon.

Claims 4 and 5 are thus rejected under 35 USC 103(a) as being unpatentable over Zhang ' 733 together with Saraswat.

With respect to dependent claims 10 and 11, Zhang '733's first active layer 26a further includes nickel at a concentration of $1x10^{15}$ to $1x10^{16}$ atoms/cm^3 (see column 9, lines 64-66).

Claims 10 and 11 are thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to independent claim 30, Zhang '733 discloses a semiconductor device having an active matrix display device (see the entire patent, particularly the Fig. 3 disclosure and the Fig. 5 embodiment thereof, for example), said display device comprising: a substrate 21 having an insulating surface; a plurality of pixel electrodes arranged in a matrix former over said substrate; a plurality of first thin film transistors for

switching said pixel electrodes and formed over said substrate; a driver circuit formed over said substrate for driving said plurality of first thin film transistors, said driver circuit comprising at least one second thin film transistor; each of said first thin film transistors and said second thin film transistor comprising: a semiconductor film 23 comprising silicon and including at least one channel region; a gate insulating film 27 adjacent to said channel region; and a gate electrode 28 adjacent to said gate insulating film, wherein the semiconductor film 23 of each of said first thin film transistors and said second thin film transistor are formed on the substrate having the insulating surface.

The difference between Zhang '733's semiconductor device and claim 30's semiconductor device is claim 30 recites: "wherein the semiconductor film of said second thin film transistor contains germanium and the semiconductor film of the first thin film transistors is not intentionally added with germanium and a concentration of germanium in the semiconductor film of the second thin film transistor is higher than a concentration of germanium in the semiconductor film of the first thin film transistor" (i.e., the difference is that the semiconductor film of Zhang '733's and claim 30's driver circuit transistors comprise silicon (Si) and $Si_{1-x}Ge_x$ where $0<x<1$, respectively).

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '733's driver/second thin film transistors' active layer 26a of $Si_{1-x}Ge_x$ where $0<x<1$ instead of

silicon, in order to improve the driver circuit transistors' electrical characteristics, as taught by Saraswat.

Claim 30 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to dependent claim 31, the semiconductor film 26b of said plurality of Zhang '733's first thin film transistors is not added with germanium while the semiconductor film 26a of Zhang '733's driver/second thin film transistor is added with germanium (as per Saraswat's teaching, as explained above in the discussion of independent claim 30).

Claim 31 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to independent claim 33, Zhang '733 discloses a semiconductor device (see the entire patent, including the Fig. 5 embodiment, for example) comprising: a substrate 21 having an insulating surface; a first thin film transistor formed over said substrate, said first thin film transistor comprising: a first semiconductor film 26a comprising crystalline silicon formed over said substrate and having a channel region; a first gate insulating film 27 adjacent to said first semiconductor film; and a first gate electrode 28(a or b) adjacent to said first gate insulating film; a second thin film transistor formed over said substrate, said second thin film transistor comprising: a second semiconductor film 26b comprising crystalline silicon formed over said substrate and having a channel region; a second gate insulating film 27 adjacent to said second semiconductor film; and a second gate electrode 28c adjacent to said second gate

insulating film, wherein the first semiconductor film 26a and the second semiconductor film 26b are formed on the substrate having the insulating surface.

Zhang '733's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 26a is part of a peripheral driver circuit and the second thin film transistor having a second active layer 26b is part of the matrix region.

The difference between Zhang '733's semiconductor device and claim 33's semiconductor device is claim 33 recites: "wherein said first semiconductor film contains germanium at a higher concentration than said second semiconductor film and the second semiconductor film is not intentionally added with germanium" (i.e., the difference is Zhang '733's first thin film transistor's active layer 26a comprises silicon while claim 33's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$).

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '733's first thin film transistor's active layer 26a of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 33 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to dependent claim 34, Zhang '733's first semiconductor film 26a is added with germanium (as per Saraswat's teaching, as explained above in the

discussion of independent claim 33) while Zhang's second semiconductor film 26b is not intentionally added with germanium.

Claim 34 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to dependent claims 39-42, Zhang '733's first active layer 26a further comprises nickel (see column 9, lines 64-66).

Claims 39-42 are thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to dependent claims 44-47, each of Zhang '733's first and second active layers 26a and 26b further comprises nickel (see the Fig. 2 embodiment).

Claims 44-47 are thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to independent claim 49, Zhang '733 discloses a semiconductor device (see the entire patent, including the Fig. 5 embodiment, for example) comprising: a substrate 21; an underlying layer 22 formed over the substrate; a first thin film transistor having a first active layer 26a comprising silicon (Si) formed over said underlying layer; and a second thin film transistor having a second active layer 26b comprising silicon formed over said underlying layer wherein said second active layer is not intentionally added with germanium, wherein the first active layer 26a and the second active layer 26b are formed on a same insulating surface over the substrate.

Zhang '733's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 26a is part of a peripheral driver circuit and the second thin film transistor having a second active layer 26b is part of the matrix region.

The difference between Zhang '733's semiconductor device and claim 49's semiconductor device is Zhang '733's first thin film transistor's active layer comprises silicon while claim 49's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$.

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '733's first thin film transistor's active layer 26a of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 49 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to dependent claim 50, Zhang '733's underlying film 22 is silicon oxide (see column 9, lines 55-60).

Claim 50 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to independent claim 51, Zhang '733 discloses a semiconductor device (see the entire patent, including the Fig. 5 embodiment, for example) comprising:

a substrate 21; a first thin film transistor having a first active layer 26a comprising silicon (Si) formed over said substrate; and a second thin film transistor having a second active layer 26b comprising silicon formed over said substrate wherein said second active layer is not intentionally doped with germanium, wherein the first active layer and the second active layer are formed on a same insulating surface over the substrate, wherein the first active layer and the second active layer include a metal capable of promoting crystallization of silicon (see column 9, line 62, through column 10, line 20), and wherein said first and second active layers are polycrystalline silicon (see column 10, lines 5-20).

Zhang '733's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 26a is part of a peripheral driver circuit and the second thin film transistor having a second active layer 26b is part of the matrix region.

The difference between Zhang '733's semiconductor device and claim 51's semiconductor device is Zhang '733's first thin film transistor's active layer comprises silicon while claim 1's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$.

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '733's first thin film transistor's active layer 26a of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 51 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to independent claim 52, Zhang '733 discloses a semiconductor device (see the entire patent, including the Fig. 5 embodiment, for example) comprising: a substrate 21 having an insulating surface; a first thin film transistor formed over said substrate, said first thin film transistor comprising: a first semiconductor film 26a comprising crystalline silicon formed over said substrate and having a channel region; a first gate insulating film 27 adjacent to said first semiconductor film; and a first gate electrode 28(a or b) adjacent to said first gate insulating film; a second thin film transistor formed over said substrate, said second thin film transistor comprising: a second semiconductor film 26b comprising crystalline silicon formed over said substrate and having a channel region; a second gate insulating film 27 adjacent to said second semiconductor film; and a second gate electrode 28c adjacent to said second gate insulating film, wherein the first semiconductor film 26a and the second semiconductor film 26b are formed on the substrate 21 having the insulating surface, wherein the first semiconductor film and the second semiconductor film include a metal capable of promoting crystallization of silicon (see column 9, line 60, through column 10, line 20), and wherein said first and second semiconductor films are polycrystalline silicon (see column 10, lines 5-20).

Zhang '733's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 26a is part of a peripheral driver circuit and the second thin film transistor having a second active layer 26b is part of the matrix region.

The difference between Zhang '733's semiconductor device and claim 52's semiconductor device is claim 52 recites: "wherein said first semiconductor film contains germanium at a higher concentration than said second semiconductor film and the second semiconductor film is not intentionally added with germanium" (i.e., the difference is Zhang '733's first thin film transistor's active layer 26a comprises silicon while claim 52's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$).

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '733's first thin film transistor's active layer 26a of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 52 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to dependent claims 55 and 56, Zhang '733's crystallization-promoting metal is nickel (again, see column 9, line 60, through column 10, line 20).

Claims 55 and 56 are thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

Claims 53 and 54 are rejected under 35 USC 103(a) as being unpatentable over Zhang et al. (United States Patent 5,614,733 – hereafter Zhang '733 – cited in the Information Disclosure Statement filed April 23, 2001) together with Saraswat et al. (United States Patent 5,250,818 – hereafter Saraswat – already of record) and Yamazaki et al. (United States Patent 6,160,271 – hereafter Yamazaki – already of record).

Specifically, the difference between the obvious Zhang '733 / Saraswat semiconductor device (discussed above with respect to independent claims 51 and 52) and dependent claims 53 and 54 is claims 53 and 54 recite that the semiconductor device is used in a variety of electronic devices.

Yamazaki teaches using semiconductor devices such as Zhang '733's semiconductor device in the claimed variety of electronic devices (see Yamazaki's Fig. 7 disclosure).

It would have been further obvious to one skilled in this art to use the obvious Zhang '733 / Saraswat semiconductor device in the claimed variety of electronic devices, as taught by Yamazaki.

Claims 53 and 54 are thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat and Yamazaki.

Claims 1, 2, 7, 8, 30, 31, 36, 37, 49 and 50 are rejected under 35 USC 103(a) as being unpatentable over Zhang et al. (United States Patent 5,648,277 – hereafter Zhang '277 – cited in the Information Disclosure Statement filed March 4, 1999)

together with Saraswat et al. (United States Patent 5,250,818 – hereafter Saraswat – already of record).

With respect to independent claim 1, Zhang '277 discloses a semiconductor device (see the entire patent, particularly the Fig. 6 disclosure) comprising: a substrate 1201; a first thin film transistor 1232 (or 1233) having a first active layer 1203 comprising silicon (Si) formed over said substrate; and a second thin film transistor 1234 having a second active layer 1204 comprising silicon formed over said substrate wherein said second active layer is not intentionally doped with germanium, wherein the first active layer and the second active layer are formed on a same insulating surface over the substrate.

Zhang '277's semiconductor device is an active-matrix circuit. The first thin film transistor 1232 (or 1233) having a first active layer 1203 is part of a peripheral driver circuit and the second thin film transistor 1234 having a second active layer 1204 is part of the active matrix region (see column 14, lines 61-65, for example).

The difference between Zhang '277's semiconductor device and claim 1's semiconductor device is Zhang '277's first thin film transistor's active layer 1203 comprises silicon while claim 1's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$.

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '277's first thin film transistor's active layer 1203 of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 1 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '277 together with Saraswat.

With respect to independent claim 2, Zhang '277 discloses a semiconductor device (see the entire patent, particularly the Fig. 6 disclosure) comprising: a substrate 1201; a first thin film transistor 1232/1233 having a first active layer 1203 comprising silicon (Si) formed over said substrate; and a second thin film transistor 1234 having a second active layer 1204 comprising silicon formed over said substrate, wherein said second active layer contains no germanium, wherein the first active layer 1203 and the second active layer 1204 are formed on a same insulating surface over said substrate, and wherein said first thin film transistor constitutes a CMOS circuit.

Zhang '277's semiconductor device is an active-matrix circuit. The first thin film transistor 1232/1233 having a first active layer 1203 is part of a peripheral driver circuit and the second thin film transistor 1234 having a second active layer 1204 is part of the active matrix region (see column 14, lines 61-65).

The difference between Zhang '277's semiconductor device and claim 2's semiconductor device is Zhang '277's first thin film transistor's active layer 1203 comprises silicon while claim 2's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$.

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '277's first thin film transistor's active layer 1203 of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 2 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '733 together with Saraswat.

With respect to dependent claims 7 and 8, Saraswat's $Si_{1-x}Ge_x$ is polycrystalline silicon germanium (see the Abstract, for example) and Zhang '277's silicon 1204 remains amorphous silicon (see column 15, line 16).

Claims 7 and 8 are thus rejected under 35 USC 103(a) as being unpatentable over Zhang '277 together with Saraswat.

With respect to independent claim 30, Zhang '277 discloses a semiconductor device having an active matrix display device (see the entire patent, particularly the Figs. 6-7 disclosure), said display device comprising: a substrate 1201 having an insulating surface; a plurality of pixel electrodes 9 arranged in a matrix former over said substrate; a plurality of first thin film transistors 1234 for switching said pixel electrodes and formed over said substrate; a driver circuit formed over said substrate for driving said plurality of first thin film transistors, said driver circuit comprising at least one second thin film transistor 1232/1233; each of said first thin film transistors and said

second thin film transistor comprising: a semiconductor film (1204 and 1203, respectively) comprising silicon and including at least one channel region; a gate insulating film adjacent to said channel region; and a gate electrode adjacent to said gate insulating film, wherein the semiconductor film of each of said first thin film transistors and said second thin film transistor are formed on the substrate having the insulating surface.

Zhang '277's semiconductor device is an active-matrix circuit. The first thin film transistor 1232/1233 having a first active layer 1203 is part of a peripheral driver circuit and the second thin film transistor 1234 having a second active layer 1204 is part of the active matrix region (see column 14, lines 61-65).

The difference between Zhang '277's semiconductor device and claim 30's semiconductor device is claim 30 recites: "wherein the semiconductor film of said second thin film transistor contains germanium and the semiconductor film of the first thin film transistors is not intentionally added with germanium and a concentration of germanium in the semiconductor film of the second thin film transistor is higher than a concentration of germanium in the semiconductor film of the first thin film transistor" (i.e., the difference is that the semiconductor film of Zhang '277's and claim 30's driver circuit transistors comprise silicon (Si) and $Si_{1-x}Ge_x$ where $0<x<1$, respectively).

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '277's driver/second thin film transistors' active layer 1203 of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve the driver circuit transistors' electrical characteristics, as taught by Saraswat.

Claim 30 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '277 together with Saraswat.

With respect to dependent claim 31, the semiconductor film 1204 of said plurality of Zhang '277's first thin film transistors is not added with germanium while the semiconductor film 1203 of Zhang '277's driver/second thin film transistor is added with germanium (as per Saraswat's teaching, as explained above in the discussion of independent claim 30).

Claim 31 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '277 together with Saraswat.

With respect to independent claim 36, Zhang '277 discloses a semiconductor device (see the entire patent, particularly the Fig. 6 disclosure) comprising: a substrate 1201 having an insulating surface; a first thin film transistor 1232 (or 1233) formed over said substrate, said first thin film transistor comprising: a first semiconductor film 1203 comprising crystalline silicon formed over said substrate and having a channel region; a first gate insulating film adjacent to said first semiconductor film; and a first gate electrode adjacent to said first gate insulating film; a second thin film transistor 1234 formed over said substrate, said second thin film transistor comprising: a second semiconductor film 1204 comprising amorphous silicon (see column 15, line 16) formed

over said substrate and having a channel region; a second gate insulating film adjacent to said second semiconductor film; and a second gate electrode adjacent to said second gate insulating film, wherein the first semiconductor film 1203 and the second semiconductor film 1204 are formed on the substrate having the insulating surface.

Zhang '277's semiconductor device is an active-matrix circuit. The first thin film transistor 1232/1233 having a first active layer 1203 is part of a peripheral driver circuit and the second thin film transistor 1234 having a second active layer 1204 is part of the active matrix region (see column 14, lines 61-65).

The difference between Zhang '277's semiconductor device and claim 36's semiconductor device is claim 36 recites: "wherein said first semiconductor film contains germanium at a higher concentration than said second semiconductor film and the second semiconductor film is not intentionally added with germanium" (i.e., the difference is Zhang '277's first thin film transistor's active layer 1203 comprises silicon while claim 36's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$).

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '277's first thin film transistor's active layer 1203 of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 36 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '277 together with Saraswat.

With respect to dependent claim 37, Zhang '277's first semiconductor film 1203 is added with germanium (as per Saraswat's teaching, as explained above in the discussion of independent claim 36) while the second semiconductor film 1204 is not intentionally added with germanium.

Claim 37 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '277 together with Saraswat.

With respect to independent claim 49, Zhang '277 discloses a semiconductor device (see the entire patent, particularly the Fig. 6 disclosure) comprising: a substrate 1201; an underlying layer 1202 formed over the substrate; a first thin film transistor 1232 (or 1233) having a first active layer 1203 comprising silicon (Si) formed over said underlying layer; and a second thin film transistor 1234 having a second active layer 1204 comprising silicon formed over said underlying layer wherein said second active layer is not intentionally added with germanium, wherein the first active layer 1203 and the second active layer 1204 are formed on a same insulating surface over the substrate.

Zhang '277's semiconductor device is an active-matrix circuit. The first thin film transistor 1232 (or 1233) having a first active layer 1203 is part of a peripheral driver circuit and the second thin film transistor 1234 having a second active layer 1204 is part of the active matrix region (see column 14, lines 61-65, for example).

The difference between Zhang '277's semiconductor device and claim 49's semiconductor device is Zhang '277's first thin film transistor's active layer comprises silicon while claim 49's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$.

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Zhang '277's first thin film transistor's active layer 1203 of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 49 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '277 together with Saraswat.

With respect to dependent claim 50, Zhang '277's underlying film 1202 is silicon oxide (see column 15, line 1).

Claim 50 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '277 together with Saraswat.

Claim 38 is rejected under 35 USC 103(a) as being unpatentable over Zhang et al. (United States Patent 5,648,277 – hereafter Zhang '277 – cited in the Information Disclosure Statement filed March 4, 1999) together with Saraswat et al. (United States Patent 5,250,818 – hereafter Saraswat – already of record) and Yamazaki et al. (United States Patent 6,160,271 – hereafter Yamazaki – already of record).

Specifically, the difference between the obvious Zhang '277 / Saraswat semiconductor device (discussed above with respect to independent claim 36) and dependent claim 38 is claim 38 recites that the semiconductor device is used in a variety of electronic devices.

Yamazaki teaches using semiconductor devices such as Zhang '277's semiconductor device in the claimed variety of electronic devices (see Yamazaki's Fig. 7 disclosure).

It would have been further obvious to one skilled in this art to use the obvious Zhang '277 / Saraswat semiconductor device in the claimed variety of electronic devices, as taught by Yamazaki.

Claim 38 is thus rejected under 35 USC 103(a) as being unpatentable over Zhang '277 together with Saraswat and Yamazaki.

Claims 1, 2, 4, 5, 10, 11, 13, 14, 30-35, 39-42, 44-47, 49 and 51-56 are rejected under 35 USC 103(a) as being unpatentable over Yamazaki et al. (United States Patent 6,160,271 – hereafter Yamazaki – already of record) together with Saraswat et al. (United States Patent 5,250,518 – hereafter Saraswat – already of record).

With respect to independent claim 1, Yamazaki discloses a semiconductor device (see the entire patent, particularly the Figs. 1-4 disclosure) comprising: a substrate 101; a first thin film transistor having a first active layer 109 (or 110) comprising silicon (Si) formed over said substrate; and a second thin film transistor having a second active layer 111 comprising silicon formed over said substrate wherein said second active layer is not intentionally doped with germanium, wherein the first

active layer 109 (or 110) and the second active layer 111 are formed on a same insulating surface over the substrate.

Yamazaki's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 109 (and/or 110) is part of a peripheral driver circuit and the second thin film transistor having a second active layer 111 is part of the pixel matrix circuit (see column 3, lines 31-39, and column 4, lines 31-41, for example).

The difference between Yamazaki's semiconductor device and claim 1's semiconductor device is Yamazaki's first thin film transistor's active layer 109 (and/or 110) comprises silicon while claim 1's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$.

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki's first thin film transistor's active layer 109 (and/or 110) of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 1 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to independent claim 2, Yamazaki discloses a semiconductor device (see the entire patent, particularly the Figs. 1-4 disclosure) comprising: a

substrate 101; a first thin film transistor having a first active layer 109/110 comprising silicon (Si) formed over said substrate; and a second thin film transistor having a second active layer 111 comprising silicon formed over said substrate, wherein said second active layer contains no germanium, wherein the first active layer 109/110 and the second active layer 111 are formed on a same insulating surface over the substrate, and wherein said first thin film transistor constitutes a CMOS circuit (see column 4, lines 31-41).

Yamazaki's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 109/110 is part of a peripheral driver circuit and the second thin film transistor having a second active layer 111 is part of the matrix region.

The difference between Yamazaki's semiconductor device and claim 2's semiconductor device is Yamazaki's first thin film transistor's active layer 109/110 comprises silicon while claim 2's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$.

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki's first thin film transistor's active layer 109/110 of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 2 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to dependent claims 4 and 5, Saraswat's $Si_{1-x}Ge_x$ is polycrystalline silicon germanium (see Saraswat's Abstract, for example) and Yamazaki's silicon 111 is polysilicon.

Claims 4 and 5 are thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to dependent claims 10 and 11, Yamazaki's first active layer 109 and/or 110 further includes nickel at a concentration of $1x10^{15}$ to $1x10^{16}$ atoms/cm^3 (see column 5, lines 18-24).

Claims 10 and 11 are thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to dependent claims 13 and 14, Yamazaki's semiconductor device is selected from the group consisting of a handy phone, a video camera, a mobile computer, a head mount display, etc. (see Yamazaki's Fig. 7 disclosure).

Claims 13 and 14 are thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to independent claim 30, Yamazaki discloses a semiconductor device having an active matrix display device (see the entire patent, particularly the Figs. 1-4 disclosure), said display device comprising: a substrate 101 having an insulating surface; a plurality of pixel electrodes arranged in a matrix former over said substrate; a plurality of first thin film transistors for switching said pixel electrodes and

formed over said substrate; a driver circuit formed over said substrate for driving said plurality of first thin film transistors, said driver circuit comprising at least one second thin film transistor; each of said first thin film transistors and said second thin film transistor comprising: a semiconductor film (111 for the first thin film transistors and 109 and/or 110 for the second thin film transistors) comprising silicon and including at least one channel region; a gate insulating film adjacent to said channel region; and a gate electrode adjacent to said gate insulating film, wherein the semiconductor film of each of said first thin film transistors and said second thin film transistor are formed on the substrate having the insulating surface.

Yamazaki's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 109 (and/or 110) is part of a peripheral driver circuit and the second thin film transistor having a second active layer 111 is part of the pixel matrix circuit (see column 3, lines 31-39, and column 4, lines 31-41, for example).

The difference between Yamazaki's semiconductor device and claim 30's semiconductor device is claim 30 recites: "wherein the semiconductor film of said second thin film transistor contains germanium and the semiconductor film of the first thin film transistors is not intentionally added with germanium and a concentration of germanium in the semiconductor film of the second thin film transistor is higher than a concentration of germanium in the semiconductor film of the first thin film transistor" (i.e., the difference is that the semiconductor film of Yamazaki's and claim 30's driver circuit transistors comprise silicon (Si) and $Si_{1-x}Ge_x$ where $0<x<1$, respectively).

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki's driver/second thin film transistors' active layer 109 and/or 110 of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve the driver circuit transistors' electrical characteristics, as taught by Saraswat.

Claim 30 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to dependent claim 31, the semiconductor film 111 of said plurality of Yamazaki's first thin film transistors is not added with germanium while the semiconductor film 109 and/or 110 of Yamazaki's driver/second thin film transistor is added with germanium (as per Saraswat's teaching, as explained above in the discussion of independent claim 30).

Claim 31 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to dependent claim 32, Yamazaki's semiconductor device is selected from the group consisting of a handy phone, a video camera, a mobile computer, a head mount display, etc. (see Yamazaki's Fig. 7 disclosure).

Claim 32 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to independent claim 33, Yamazaki discloses a semiconductor device (see the entire patent, particularly the Figs. 1-4 disclosure) comprising: a substrate 101 having an insulating surface; a first thin film transistor formed over said substrate, said first thin film transistor comprising: a first semiconductor film 109 (or 110) comprising crystalline silicon formed over said substrate and having a channel region; a first insulating film adjacent to said first semiconductor film; and a first gate electrode 113 (or 114) adjacent to said first gate insulating film; a second thin film transistor formed over said substrate, said second thin film transistor comprising: a second semiconductor film 111 comprising crystalline silicon formed over said substrate and having a channel region; a second gate insulating film adjacent to said second semiconductor film; and a second gate electrode 115 adjacent to said second gate insulating film, wherein the first semiconductor film 109 (or 110) and the second semiconductor film 111 are formed on the substrate having the insulating surface.

Yamazaki's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 109 (and/or 110) is part of a peripheral driver circuit and the second thin film transistor having a second active layer 111 is part of the pixel matrix circuit (see column 3, lines 31-39, and column 4, lines 31-41, for example).

The difference between Yamazaki's semiconductor device and claim 33's semiconductor device is claim 33 recites: "wherein said first semiconductor film contains germanium at a higher concentration than said second semiconductor film and the second semiconductor film is not intentionally added with germanium" (i.e., the difference is Yamazaki's first thin film transistor's active layer 109 (and/or 110)

comprises silicon while claim 33's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$).

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki's first thin film transistor's active layer 109 (and/or 110) of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 33 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to dependent claim 34, Yamazaki's first semiconductor film 109 (and/or 110) is added with germanium (as per Saraswat's teaching, as explained above in the discussion of independent claim 33) while Yamazaki's second semiconductor film is not intentionally added with germanium.

Claim 34 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to dependent claim 35, Yamazaki's semiconductor device is selected from a group consisting of a handy phone, a video camera, a mobile computer, a head mount display, etc. (see Yamazaki's Fig. 7 disclosure).

Claim 35 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to dependent claims 39-42, Yamazaki's first active layer 109 and/or 110 further includes nickel (see column 5, lines 18-24).

Claims 39-42 are thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to dependent claims 44-47, each of Yamazaki's first and second active layers 109/110 and 111 further comprises nickel (see column 5, lines 18-24).

Claims 44-47 are thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to independent claim 49, Yamazaki discloses a semiconductor device (see the entire patent, particularly the Figs. 1-4 disclosure) comprising: a substrate 101; an underlying layer formed on the substrate (see column 3, lines 41-45); a first thin film transistor having a first active layer 109 (or 110) comprising silicon (Si) formed over said underlying layer; and a second thin film transistor having a second active layer 111 comprising silicon formed over said underlying layer wherein said second active layer is not intentionally added with germanium, wherein the first active layer and the second active layer are formed on a same insulating surface over the substrate.

Yamazaki's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 109 (and/or 110) is part of a peripheral driver circuit

and the second thin film transistor having a second active layer 111 is part of the pixel matrix circuit (see column 3, lines 31-39, and column 4, lines 31-41, for example).

The difference between Yamazaki's semiconductor device and claim 49's semiconductor device is Yamazaki's first thin film transistor's active layer 109 (and/or 110) comprises silicon while claim 49's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$.

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki's first thin film transistor's active layer 109 (and/or 110) of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 49 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to independent claim 51, Yamazaki discloses a semiconductor device (see the entire patent, particularly the Figs. 1-4 disclosure) comprising: a substrate 101; a first thin film transistor having a first active layer 109 (or 110) comprising silicon (Si) formed over said substrate; and a second thin film transistor having a second active layer 111 comprising silicon formed over said substrate wherein said second active layer is not intentionally doped with germanium, wherein the first

active layer and the second active layer are formed on a same insulating surface over the substrate, wherein the first active layer and the second active layer include a metal capable of promoting crystallization of silicon (see column 4, lines 4-10), and wherein said first and second active layers are polycrystalline silicon (see column 4, lines 4-42).

Yamazaki's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 109 (and/or 110) is part of a peripheral driver circuit and the second thin film transistor having a second active layer 111 is part of the pixel matrix circuit (see column 3, lines 31-39, and column 4, lines 31-41, for example).

The difference between Yamazaki's semiconductor device and claim 51's semiconductor device is Yamazaki's first thin film transistor's active layer 109 (and/or 110) comprises silicon while claim 51's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$.

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki's first thin film transistor's active layer 109 (and/or 110) of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 51 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to independent claim 52, Yamazaki discloses a semiconductor device (see the entire patent, particularly the Figs. 1-4 disclosure) comprising: a substrate 101 having an insulating surface; a first thin film transistor formed over said substrate, said first thin film transistor comprising: a first semiconductor film 109 (or 110) comprising crystalline silicon formed over said substrate and having a channel region; a first gate insulating film adjacent to said first semiconductor film; and a first gate electrode 113 (or 114) adjacent to said first gate insulating film; a second thin film transistor formed over said substrate, said second thin film transistor comprising: a second semiconductor film 111 comprising crystalline silicon formed over said substrate and having a channel region; a second gate insulating film adjacent to said second semiconductor film; and a second gate electrode 115 adjacent to said second gate insulating film, wherein the first semiconductor film and the second semiconductor film are formed on the substrate having the insulating surface, wherein the first semiconductor film and the second semiconductor film include a metal capable of promoting crystallization of silicon (see column 4, lines 4-10), and wherein said first and second semiconductor films are polycrystalline silicon (see column 4, lines 4-42).

Yamazaki's semiconductor device is an active-matrix circuit. The first thin film transistor having a first active layer 109 (and/or 110) is part of a peripheral driver circuit and the second thin film transistor having a second active layer 111 is part of the pixel matrix circuit (see column 3, lines 31-39, and column 4, lines 31-41, for example).

The difference between Yamazaki's semiconductor device and claim 52's semiconductor device is claim 52 recites: "wherein said first semiconductor film

contains germanium at a higher concentration than said second semiconductor film and the second semiconductor film is not intentionally added with germanium" (i.e., the difference is Yamazaki's first thin film transistor's active layer 109 (and/or 110) comprises silicon while claim 52's first thin film transistor's active layer comprises $Si_{1-x}Ge_x$ where $0<x<1$).

Saraswat teaches forming an active-matrix circuit's peripheral driver transistors from $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, because the resulting transistors have significantly improved electrical characteristics, such as higher mobility (see the entire patent, particularly column 1, lines 20-58, and column 2, lines 19-43).

It would have been obvious to one skilled in this art to form Yamazaki's first thin film transistor's active layer 109 (and/or 110) of $Si_{1-x}Ge_x$ where $0<x<1$ instead of silicon, in order to improve that driver circuit transistor's electrical characteristics, as taught by Saraswat.

Claim 52 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to dependent claims 53 and 54, Yamazaki's semiconductor device is selected from the group consisting of a handy phone, a video camera, a mobile computer, a head mount display, etc. (see Yamazaki's Fig. 7 disclosure).

Claims 53 and 54 thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

With respect to dependent claims 55 and 56, Yamazaki's crystallization-promoting metal is nickel (again, see column 4, lines 4-10).

Claims 55 and 56 are thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat.

Claim 50 is rejected under 35 USC 103(a) as being unpatentable over Yamazaki et al. (United States Patent 6,160,271 – hereafter Yamazaki – already of record) together with Saraswat et al. (United States Patent 5,250,818 – hereafter Saraswat – already of record) and Zhang et al. (United States Patent 5,648,277 – hereafter Zhang '277 – cited in the Information Disclosure Statement filed March 4, 1999).

Specifically, the difference between the obvious Yamazaki / Saraswat semiconductor device (discussed above with respect to independent claim 49) and dependent claim 50 is claim 50 recites that the underlying layer on the substrate is silicon oxide (Yamazaki does not disclose the composition of its underlying layer).

Zhang '277 teaches that such an underlying layer is conventionally silicon oxide (see column 15, lines 1-4).

It would have been further obvious to one skilled in this art to form the obvious Yamazaki / Saraswat semiconductor device's underlying layer of silicon oxide, as taught by Zhang '277.

Claim 50 is thus rejected under 35 USC 103(a) as being unpatentable over Yamazaki together with Saraswat and Zhang '277.

The applicant's arguments are not persuasive.

First, although the applicant lists the separate rejections on page 8 of its response, the applicant fails to specifically and squarely address, let alone rebut, those

separate rejections at all, let alone on the claim-by-claim basis set forth in the explanations of each of those separate rejections.

Furthermore, the limitation added to each of the independent claims is disclosed not only by Zhang '277 (see the relied upon Fig. 6), but by Zhang '733 and Yamazaki as well, as explained in the detailed explanations of each of the separate rejections.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Registered practitioners can telephone examiner Prenty at (703) 308-4939. Any voicemail message left for the examiner must include the name and registration number of the registered practitioner calling, and the application's Serial Number. Technology Center 2800's general telephone number is (703) 308-0956.

Mark Prenty

Mark V. Prenty
Primary Examiner